

**PROGRAMMATIC REVIEW
OF THE
ENVIRONMENTAL TECHNOLOGY LABORATORY**

A UNIT OF THE NOAA ENVIRONMENTAL RESEARCH LABORATORIES

**Conducted by the Director
Environmental Research Laboratories**

**November, 13 and 14, 1996
Boulder, Colorado**

PROGRAMMATIC REVIEW OF THE ENVIRONMENTAL TECHNOLOGY LABORATORY

A group of NOAA and non-NOAA scientists visited the ETL on November 13 and 14, 1996 to take a closer look at the science programs at the Laboratory and to suggest ways in which those programs could be improved. The group of visitors consisted of:

Dr. Sumner Barr, Los Alamos National Laboratory
Dr. Rober Gall, National Center for Atmospheric Research
Dr. Richard Hodur, Navy Research Laboratory
Dr. Steve Mango, National Polar Orbiting Environmental Satellite System Program
Dr. Juergen Richter, Naval Research and Development
Professor Roddy Rogers, McGill University
Dr. James Rasmussen, Director, Environmental Research Laboratories
Dr. John Calder, Deputy Director, ERL
Dr. Jeff Payne, Deputy Director, NOAA Office of Policy and Strategic Planning

The review was conducted in Boulder, Colorado during November 13 and 14, 1996. The agenda is attached. The structure of the review included formal presentations, question and answer periods, poster presentations and small group discussions, a public comment period, and a final executive session with managers from ETL, ERL, and NOAA, along with the external review panel. This report will not try to summarize the formal presentations and discussions, but will summarize the comments of the reviewers, managers, and other guests in six areas that were identified as critical for ETL. Each of the reviewers submitted a letter report following the review and these are appended to this summary report.

1. ETL Vision:

The review provided a good summary of ETL's accomplishments and current activities, but did not provide a clear sense of where ETL is headed in the future. It was felt that without a clearly stated forward looking vision, there is a risk that ETL's resources might be spread too thinly, that users of all types would not come to expect anything from ETL, and that ETL itself might not fully capitalize on opportunities. Therefore it is recommended that ETL **develop a long term plan (at least 3 to 5 years) that will guide the use of its base funds and focus its search for external funding.** The plan should also enable better management of Federal staff at ETL in the face of changes in funding and FTE allocations.

2. Technology Transfer:

According to the overview by the Director of ETL, the mission of the laboratory is to create new remote environmental observing systems, and one of its core disciplines is to transfer technology for the benefit of the Nation and the public. The review was a showcase of ETL's technology

development, past and present, and the reviewers concluded that ETL is one of the best, perhaps the very best, laboratory in the U.S. for applying wave propagation science to environmental observations. There have been marked successes in transferring ETL's technology to other users, e.g. wind profiler network. There have also been several activities in which ETL's technology was deployed on a one time basis as part of research or monitoring program to demonstrate the new capabilities to others. There was considerable discussion regarding the overall concept of technology transfer. Significant points included:

- A challenge is to create users, rather than waiting for user pull. This requires effective marketing of the technologies that ETL has developed or could develop.
- Converting newly developed technologies to operational status requires much energy to create financial support. Whose job is this?
- New measurement systems require investments not only in the system, but in data management, data assimilation and better models, forecaster/user workstations for data integration, and user training both on the job and through formal education.
- Presentations during the review did not explore the links between early technology development and ultimate technology transfer.

From the presentations, it seems clear that there are several emerging applications for recently developed technology, including:

- application of DIAL systems to routing monitoring over urban areas
- application of cloud sensing systems to climate observations
- manipulation of wind profiler data to derive water vapor information
- deployment of buoy-based wind profiler to extend observational opportunities to marine areas
- implementing the concept of integrated sensing systems

The sentiment was expressed the ETL must do more to push its technological developments and thereby develop and enhance the user pull that will be necessary to bring most technologies to operational status. It was noted particularly, the ETL seems to pay little attention to NOAA's own operational needs. It is recommended that **ETL promote itself, and be promoted by its upper management, more effectively to potential NOAA customers.** ETL should seek to connect directly to the National Weather Service Strategic Plan and participate more aggressively in the NOAA strategic and implementation planning processes. It was stated by an ETL manager that the Forecast Systems Laboratory, another of the ERL laboratories, acts as the intermediary between ETL and the NWS. If this arrangement is meant to be a primary technology transfer mechanism, it should be documented and made known throughout NOAA.

3. Interactions with the modeling community:

Many presentations dealt with the issue of modeling, for example:

- the TOGA-COARE flux algorithm is being used in mesoscale models and may be extended to GCMs
- ETL is developing a coupled ocean-atmosphere-wave model in collaboration with CU

During the executive session, ETL managers stated that modelers are not yet aware of what ETL's new observing systems can provide and that the modeling community must be alerted to these new data types. One of the reviewers noted that modelers will be attracted to ETL soon because new more sophisticated models will be able to assimilate new types of data.

It seems that this is another opportunity for ETL to promote its programs. It is recommended that ETL prepare a white paper that describes the potential value of assimilation of new data types into various models, and present this paper to the NOAA modeling community (e.g., other ERL labs, NCEP) and elsewhere (e.g., NCAR).

4. Partnerships:

The reviewers noted that ETL has a good track record of creating partnerships of various types to accomplish its objectives.

- Existing partnership with NCAR on lidar through the Joint Optics Group.
- Cloud radar CRADA in development.
- Extensive involvement with CIRES
- ETL is beginning to work more closely with the Science and Operations Officers in the newly designed Weather Service Forecast Offices
- Many joint projects with other agencies

Reviewers were very pleased with ETL's record of partnering and expressed the view that such arrangements will be even more necessary and important in the future. Reviewers noted such opportunities for partnering as:

- developing closer ties with the modeling community
- developing interactions with satellite-based sensing activities
- strengthening ties with the coastal and living marine resource programs in NOAA
- paying more attention to USWRP
- developing additional CRADAs

- becoming part of the emerging NCEP-NCAR-FSL relationship

It was clearly stated that the next big challenge for ETL may be to create complete systems (including observing technologies, data assimilation\models, and forecasts\other applications). Success in doing this will require effective partnerships. It is recommended that **ETL encourage more scientist-to-scientist interactions between its scientists and those of other parts of NOAA (e.g., NCEP, NOS, NMFS, NESDIS). ETL should also develop greater dialogue with interagency activities such as NPOESS and USWRP.**

5. Management:

It was stated the current funding levels of \$15.5M per year are adequate to maintain the current workforce of 155 people. It was also stated the about \$12M must be raised annually from external sources to meet this budget. These statements led the reviewers to wonder whether ETL was letting the source of funding drive its science programs, or whether science needs were guiding the choice of funding opportunities. The reviewers felt that the latter course was much preferred. Reviewers also expressed concern that the need to raise so much money each year might tend to spread the lab too thinly, and eventually weaken its ability to succeed. Indeed, there was indication already that some ETL scientists feel that they have inadequate time to fully analyze the data from field programs. The need to gather additional data to satisfy new sponsors seems to take precedence. One reviewer did note that the amount of base funding was "healthy", and stated further that it should be used to explore new opportunities and support thoughtful analysis. It is recommended the ETL management **prepare a description of the internal process used to allocate base resources between analysis and new data collection, and between taking data with existing technologies versus development of new technologies.**

6. Presentation/publication

There was complete agreement among the reviewers that the presentations made during the review were outstanding; one reviewer stated at the conclusion that "this was the best review I've ever attended". The posters were also highly lauded for their clear and informative style. The Information Resource Management group at ETL was given high marks. Also, it was noted that ETL's publication record was good and seemed well within the expected norm for research organizations.